

Claims

What is claimed is:

1. A feedback control system for monitoring and controlling optical components in a
5 node of an optical network, comprising:
 - an array of external light sources configured to emit light signals; and
 - a power-sharing coupler connected to the array of light sources for combining the light signals together to create a combined signal and subsequently splitting the combined signal into a plurality of supervisory signals for controlling said optical

10 components.

2. The control system of claim 1, wherein the power of the combined signal is distributed equally among the supervisory signals.

15 3. The control system of claim 1, wherein the node includes an input port and wherein at least one of the supervisory signals is directed to the input port of the node.

4. The control system of claim 1, further comprising:
 - an input communications channel for carrying a first data signal to an input port
20 of the node, and
 - an input coupler for combining a first supervisory signal with the first data signal in said input communications channel to transmit the first supervisory signal through said input port.

25 5. The control system of claim 4, wherein the wavelength of the first supervisory signal is different than the wavelength of the first data signal to prevent interference between the first supervisory signal and the first data signal.

6. The control system of claim 4, further comprising a monitoring component, wherein
30 the optical components transmit said first data signal and said first supervisory signal along a first data path through the node, and wherein said monitoring component utilizes said first supervisory signal to monitor the accuracy of the data path.

7. The control system of claim 4, further comprising an output coupler for separating said first supervisory signal from said first data signal after said first supervisory signal exits the node.

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8. The control system of claim 7, wherein said output coupler directs said first supervisory signal to a detector for detecting the signal and providing feedback to a controller for controlling the position of said optical components.

10 9. The control system of claim 8, wherein said detector converts said first supervisory signal to an electrical signal and forwards said electrical signal to the controller for controlling said optical components.

15 10. The control system of claim 1, further comprising a controller for adjusting said optical components in response to a supervisory signal.

11. The control system of claim 1, further comprising a detector for detecting a supervisory signal.

20 12. The control system of claim 1, wherein the node comprises a plurality of input ports and the power-sharing coupler provides a supervisory signal for each of the input ports in the node.

25 13. The control system of claim 1, wherein said optical components comprise a plurality of mirrors, and each mirror directs a data signal along a data path between an input port and an output port of the node.

14. The control system of claim 13, wherein a supervisory signal is transmitted along each of said data paths.

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15. The control system of claim 13, further comprising:
a detector for detecting said supervisory signals; and

a controller for controlling the position of said mirrors in response to said supervisory signals.

16. The control system of claim 1, further comprising a power tap for monitoring the 5 external array of light sources, wherein said power tap directs one of said supervisory signals to a supervisory detector to detect a failure of a light source.

17. The control system of claim 16, further comprising a plurality of oscillators connected to said array of external light sources to modulate said light signals.

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18. The control system of claim 17, wherein said power tap further comprises a tunable filter to identify one of said light sources in said array of external light sources that has failed.

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19. The control system of claim 1, wherein the node comprises a plurality of input ports divided into several power-sharing subgroups, and the power-sharing coupler provides a supervisory signal for each of the input ports in a first power-sharing subgroup.

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20. The control system of claim 19, further comprising a second array of external light sources and a second power-sharing coupler connected to the second array of light sources for providing a supervisory signal for each of the input ports in a second power-sharing subgroup.

21. A method of monitoring optical connections in an all-optical switch, comprising:

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providing an array of light sources emitting light signals;
combining said light signals to form a combined signal;
separating said combined signal into a plurality of supervisory signals; and
directing at least one of said supervisory signals from an input port to an output port of the switch.

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22. The method of claim 21, further comprising the step of detecting said first supervisory signal after said directing step.

23. The method of claim 22, further comprising the step of adjusting an optical component used to direct said first supervisory signal in response to said step of detecting.

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24. The method of claim 21, further comprising the step of tapping one of said plurality of supervisory signals to monitor the state of said array of light sources.

25. The method of claim 21, wherein said combined signal is distributed equally among
10 the supervisory signals.

26. An optical switch, comprising: ✓

an input port;

an output port;

15 an optical component for directing a data signal from the input port to the output port;
an array of light sources emitting light signals; and
a power-sharing coupler for combining and splitting the light signals to provide a set of supervisory laser signals, at least one of said supervisory signals being transmitted
20 from the input port to the output port to measure the accuracy of the optical component.

27. The switch of claim 26, further comprising a controller for controlling said optical component.

25 28. The switch of claim 27, further comprising a detector for detecting said one of said supervisory signals after the signal is transmitted from the input port to the output port.

29. The switch of claim 28, wherein the controller adjusts said optical component in response to a signal generated by the detector.

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30. A power-sharing coupler for directing supervisory signals through an optical switch in order to control optical components in the switch, comprising:

an intake manifold for combining a plurality of input light signals from a plurality of light sources into a combined signal; and

a distribution manifold for splitting said combined signal into a plurality of supervisory signals for monitoring the alignment of said optical components.

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31. A feedback control system for monitoring and controlling optical components in a node of an optical network, wherein the node includes a first power-sharing subgroup and a second power-sharing subgroup of optical components, the feedback control system comprising:

10 a first array of external light sources configured to emit a first set of light signals; and

a first power-sharing coupler connected to the first array of light sources for combining the first set of light signals together to create a first combined signal and subsequently splitting the first combined signal into a plurality of first supervisory

15 signals for controlling said optical components in said first power-sharing subgroup;

a second array of external light sources configured to emit a first set of light signals; and

a second power-sharing coupler connected to the second array of light sources for combining the second set of light signals together to create a second combined signal

20 and subsequently splitting the second combined signal into a plurality of second supervisory signals for controlling said optical components in said second power-sharing subgroup.